

Minimizing and Managing Potential Impacts of Injection-Induced Seismicity from Class II Disposal Wells: Practical Approaches

In response to increasing seismicity within several shale gas play nationally, EPA senior management requested the UIC National Technical Workgroup (NTW) to develop a report on injection induced seismicity and provide practical tools and recommendations for UIC permitting programs. The Induced Seismicity Working Group (WG) was assembled within the NTW. The WG developed a strategy for the report that included a comprehensive literature review, analysis of four case examples, development of an induced seismicity decision model, a description of the fundamentals of induced seismicity, and an analysis of the application of petroleum engineering methods as a diagnostic tool. Based on the literature review, the WG determined that use of petroleum engineering methods for analysis of possible injection induced seismicity represented another approach not previously considered. Case example analyses using these methods indicated correspondence between disposal well operations and seismic events in several instances.

Analysis of the case examples and literature revealed effective tools and strategies for managing suspected induced seismicity. A decision model was developed based on a general thought process, rather than specific situations, in an effort to be applicable to a broader range of scenarios. The model was designed to guide regulators through the analysis and management of potential cases of induced seismicity. Engineering tools were found to be a valuable addition when assessing possible induced seismicity; however, data quality is critical, and concerns with quality of some reported data were identified. The report includes detailed discussion of methods used and results in the appendices, as well as other information relevant to injection induced seismicity. In summary, the report highly recommends early acquisition of data and cautions against requiring definitive proof of injection induced seismicity, but taking a proactive approach instead using a multi-disciplinary skillset.